File
Recomb DNA Letter
1977

More than three years have passed since we commented upon the possible consequences of the indiscriminate use of recombinant DNA techniques (Science 185, p. 303, July 24, 1974). At that time there was no clear-cut evidence that recombinant DNA experiments were hazardous, but we believed that the properties and behavior of organisms with novel interspecies genetic combinations were unpredictable. ~~Also, unlike other fields of scientific investigation,~~ since there were no accepted codes of practice to guide recombinant DNA research. These considerations led us to recommend that certain recombinant DNA experiments should be deferred until their potential hazards could be better evaluated or until adequate methods for preventing the spread of organisms carrying recombinant DNAs were adopted. developed.

Much has happened since 1974. Now, in virtually every nation where recombinant DNA experiments are performed there have been developed are guidelines, that were developed by broadly representative groups with the necessary scientific expertise and experience, to guide the research. Though differing in detail, they agree in the essentials and, thereby, consititute a set of common practices. an internationally accepted code of to guide recombinant DNA research throughout the world. Many scientists believe that some features of the guidelines are more stringent than can be justified by the scientific evidence we now possess. Nevertheless, investigators and their institutions, aware of the debate of the past three years, have adopted the ~~recommended~~ procedures and ~~special equipment and containment~~ facilities recommended by the Guidelines. ~~in the conduct of the work~~. Consequently, the possibility that experimental organisms will be hazardous or released into the environment has been markedly reduced.

During three years of recombinant DNA experimentation carried out in many countries ~~laboratories throughout the world~~, there has been a striking change in the ~~our~~ assessment of ~~its~~ potential risks. Where it has been examined, organisms modified by recombinant DNA experiments grew poorly when ~~are at a disadvantage in~~ competing with their parental vectors or organisms. Furthermore, there is recent evidence that certain constructed DNA molecules, hitherto believed to be novel, can arise in Nature by reactions akin to those used in the laboratory. Admittedly, more experience and experiments are needed to extend our knowledge of the survival potential of a wider variety of recombinant organisms as well as the frequency and scope of naturally-occurring interspecies genetic exchanges. But these results and the fact that there is no indication of any actual or potential harm to humans or the environment are encouraging and reassuring.

Even more reassuring is the virtually unanimous agreement of experts in infectious disease and epidemiology that strain K12, the enfeebled laboratory variant of E.coli widely used for recombinant DNA experiments, is unable to colonize normal human or animal intestinal tracts. Moreover, on the basis of recent experiments and existing data, these experts have concluded that there is little or no likelihood that strain K12 can be transformed into an infectious or pathogenic organism, or even into a human intestinal inhabitant, by the acquisition of a bit of foreign DNA. The use of genetically modified derivatives of strain K12 and vectors that are not self-transmissable or mobilizable to other bacteria, provides a further measure of safety. Hence, our initial concern that the introduction and propagation of novel DNA elements on plasmids in E.coli would

result in the dissemination of these new genetic combinations to other organisms and the environment was premature, and probably, unwarranted.

On the other hand recombinant DNA methods have made possible impressive scientific advances. Substantial improvements and innovations in the experimental operations have both extended the utility of the technique and further reduced the likelihood of disseminating living organisms carrying recombinant DNA molecules. The new insights about the structure and organization of genes in higher organisms that have emerged from such work promise important revelations about their function in health and disease. Furthermore the recently reported isolation of the gene coding for insulin and the prospects for similar advances with genes coding for other therapeutic proteins brings closer the reality of practical benefits from recombinant DNA research.

Considering the encouraging news so far - the rapid advance of scientific knowledge and the absence of any indications of actual hazards from recombinant DNA research - we regard the ~~headlong~~ rush to enact legislation as unwarranted and unnecessary. Creating a costly, cumbersome bureaucracy to govern the content and methods of scientific inquiry would be unprecedented, and probably unworkable, and would surely inhibit rather than foster basic research on important biological and medical problems. This scope of governmental intervention would be justified only if the research presents a clear and substantial threat to the public health and welfare. Based on current assessments, such a ~~But such a clear and substantial~~ threat does not exist, ~~and wasting scarce public funds in an unattainable quest for zero risk is unreasonable, unwise and therefore, poor public policy.~~ We believe that the provisions of

Congressional bills S-1217 and HR-7897 will thwart basic biologic research and the achievement of its rewards for the public welfare.

-Alternate endings begin here-

In our view the application or modification of already existing mechanisms that guard the public against known hazards is a more prudent way of dealing with any remaining anxieties about recombinant DNA research.

- Ending for Version 1 -

The present NIH Guidelines, ~~constitute~~ are a conservative and satisfactory code of practice for the use of recombinant DNA methods. They apply to all segments of the research community in the same way that other standard practices are applicable to other forms of research whether publicly or privatly funded. Section 361 of The Public Health Service Act already ~~empowers~~ provides the Department of Health, Education and Welfare (HEW) with broad authority to regulate laboratory work with disease-~~working~~ producing microorganisms. Extending HEW's authority to ensure compliance with the NIH Guidelines would assure scientists, the public, and the Government that uniform standards are being applied to work in this field. Thus we believe that the application or modification of mechanisms that already exist to guard the public against known hazards is a prudent way of dealing with any presently held anxieties about recombinant DNA research.

- Ending for Version 2-

An alternative to the pending Congressional legislation is a re-examination of the assumptions and conclusions upon which their proposals are based. A panel of distinguished laymen, scientists and public officials, could make an in-depth analysis of the present status of the "recombinant DNA problem" and, taking into account our current knowledge of the risks

and the existing mechanisms for dealing with potential biohazards in research and industrial laboratories, recommend the most appropriate course of action. We are confident that dispassionate analysis free of the glare of klieglights and political invective, would provide a sounder basis for action and would better serve the needs of the public and science.

-Ending for Version 3-